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IS 9009 : 1992
(Superseding IS 3666 : 1966)

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ढलाई शाला क्रोड तेल — विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

FOUNDRY CORE OILS — SPECIFICATION

(*First Revision*)

UDC 621·743·422

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 1992

Price Group 2

Foundry Sectional Committee, MTD 14

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Foundry Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1979 covering also the requirements of IS 3666 : 1966 Tests for foundry core oils requiring booking. While reviewing the standard, the committee decided to revise it to align with the present practice being followed by the Indian industry.

Core oils are used in foundries as sand binders for manufacture of cores and moulds by the commonly known 'oil sand process'. Core oils are manufactured by blending various ingredients, such as vegetable oils, minerals oils, animal oils, natural resins, by-product residues from vegetable oil based industries and/or a mixture of two or more of these ingredients suitably blended and reacted. Although chemical tests, such as iodine number and saponification index may be performed on these oils, these do not give a direct indication of the core oil quality from the point of view of the foundrymen. Therefore, standard sand mix properties are used in this standard to determine the quality of the core oil.

Core oils are used either with cereal binders (mostly in iron foundries and non-ferrous foundries where hot strength requirements are limited) or with cereal binder and bentonite (in steel foundry applications). The behaviour of a core oil changes tremendously with bentonite addition. Therefore, two different standard sand mixes are specified in this standard. In order to maintain the uniformity of testing only white dextrin shall be used in the standard sand mix.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 APRIL 2007
TO
IS 9009 : 1992 FOUNDRY CORE OILS — SPECIFICATION

(First Revision)

[*Page* 2, *Table* 1, *Sl No*. (vi)] — Delete '10^3' for all grades.

(MTD 14)

Reprography Unit, BIS, New Delhi, India

Indian Standard

FOUNDRY CORE OILS — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard covers the requirements for evaluating the quality of foundry core oils used as binders for core and mould production.

2 REFERENCES

IS No.	*Title*
74 : 1979	Methods of sampling and test for drying oils for paints (*second revision*)
1387 : 1967	General requirements for the supply of metallurgical materials (*first revision*)
3018 : 1977	Specification for standard silica sand for raw material testing in foundries
4269 : 1981	Specification for dextrin for use in foundries (*second revision*)
12446 : 1988	Specification for bentonite for use in foundries

3 SUPPLY OF MATERIAL

3.1 General requirements relating to supply of core oils shall be as specified in IS 1387 : 1967.

3.2 The quality of the oils shall be so formulated that while handling for sand preparation in foundry or the fumes evolved during baking of cores and moulds where these oils are used shall not cause any injury or irritation to foundry workers even after prolonged use. The odour of the oil during use including baking may be agreed at the time of the enquiry and order.

4 GRADES

4.1 Core oils shall be of two grades depending upon the baking time required at 220 ± 5°C to attain the peak tensile strength.

a) Grade F — Fast Baking — Maximum strength shall be achieved within 1½ hours of baking.

NOTE — It is recommended that the sand mix prepared from this grade of oil should be used as quickly as possible.

b) Grade S — Slow Baking — Maximum strength shall be achieved between 1½ to 3 hours of baking.

4.2 Depending on the maximum strength obtained after baking, the oil shall be a further classified as L (Low strength) and H (High strength) (*see* 5).

4.3 The grade of core oil shall be designated with a symbol, which shall be a combination of gradations as specified in **4.1** and **4.2.** For example, a fast baking and high strength core oil shall be designated as core oil FH.

5 TEST REQUIREMENTS

5.1 Specific gravity (30°C/30°C), when tested in accordance with IS 74 : 1979 shall be 0·90 to 0·95 for all the grades of core oils.

5.2 Acid value, when tested in accordance with IS 74 : 1979, shall be 10 *Max* for all the grades of core oils.

5.3 Viscosity, when tested in accordance with IS 74 : 1979, shall be 0·8 to 2·0 Ns/m^2 [1] for all grades of core oils.

5.4 The requirements regarding iodine value and specification value (*see* IS 74 : 1979) shall be as agreed to between the purchaser and the manufacturer.

6 PHYSICAL PROPERTIES OF STANDARD SAND MIXES

6.1 The physical properties of dextrin-oil-sand and dextrin-bentonite oil-sand mixes, when tested according to the procedure specified in Annex A shall be as given in Table 1 for the different grades of oils.

NOTE — The composition of sand mix and their physical properties are intended for test purposes only.

6.2 The baked tensile strength of specimens baked for 3 hours shall not be less than 80 percent of the maximum baked tensile strength for all grades of oils for both standard sand mixes.

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[1] 1 Poise = 10^{-1} NS/m^2.

Table 1 Requirements of Physical Properties of Standard Sand Mixes

(*Clauses* 6.1, A-6.1 *and* B-4.1)

Sl No.	Requirement	Type of Mix			
		Dextrin-Oil-Sand Mix		Dextrin-Bentonite-Oil-Sand Mix	
		Grade of Oil			
		Grades FH and SH	Grades FL and SL	Grades FH and SH	Grades FL and SL
(1)	(2)	(3)	(4)	(5)	(6)
i)	Moisture content, percent	1·2 to 1·4	1·2 to 1·4	1·2 to 1·4	1·2 to 1·4
ii)	Green permeability	200 to 220	200 to 220	200 to 220	200 to 220
iii)	Green compression strength, MPa	0·004 to 0·004 5	0·004 to 0·004 5	0·004 to 0·004 5	0·004 to 0·004 5
iv)	Baked tensile strength, MPa	1·40 *Min*	1·03 *Min*	0·62 *Min*	0·45 *Min*
v)	Scratch hardness number	80 *Min*	80 *Min*	70 *Min*	70 *Min*
vi)	Baked gas content, cc/g	30×10^3 *Max*	30×10^3 *Max*	26×10^3 *Max*	26×10^3 *Max*

NOTE — 1 MPa = 1 N/mm^2 = 1 MN/m^2 = 0·102 0 kgf/mm^2.

7 SAMPLING

7.1 Representative samples drawn and the criteria for conformity for various requirements shall be as given in Annex B.

8 STORAGE QUALITY

8.1 The core oils, when stored in closed containers up to a period to be specified by the manufacturer (Shelf life), shall not deteriorate in any way (requirements given in **3**, **2**, **5** and **6**). The material accepted after testing on arrival shall be deemed as not complying with this standard if it does not meet with these requirements at a later date (within the shelf life period).

9 PACKING

9.1 The material shall be supplied in 200 litre capacity steel drums.

9.1.1 The other modes of packing may be mutually agreed upon at the time of enquiry and order.

10 MARKING

10.1 The containers shall be legibly marked with the grade of oil, manufacturer's name or his trade-mark, if any, production batch number, date of manufacture and date of expiry.

10.1.1 The containers may also be marked with the Standard Mark. Details available from BIS, New Delhi.

ANNEX A

(*Clause* 6.1)

METHODS OF TEST FOR FOUNDRY CORE OILS

A-1 RAW MATERIALS

A-1.1 The raw materials shall meet the following requirements.

A-1.1.1 *Sand-Silica Sand* — As specified in IS 3018 : 1977.

A-1.1.2 *White Dextrin* — conforming to Grade 2 of IS 4269 : 1981.

A-1.1.3 *Bentonite* — conforming to Grade 1 of IS 12445 : 1988.

A-2 APPARATUS

A-2.1 Paddle Type Sand Mixer — one of 5 to 10 kg mixing capacity.

A-2.2 Standard Sand-Testing Equipment — shall be used for testing physical properties of sand mixes.

A-2.3 Laboratory core baking oven with air circulation and good temperature control shall be used for baking the samples.

A-3 COMPOSITION OF STANDARD MIXES

A-3.1 Dextrin-Oil Sand Mix — The proportions of constituents in the mix shall be as follows:

Sand	Base (5 kg)
White dextrin	2 percent of sand
Core oil	1 percent of sand
Water	1·2 to 1·4 percent of sand

A-3.2 Bentonite-Dextrin-Oil Sand Mix — The proportions of the constituents shall be as follows:

Sand	Base (5 kg)
White dextrin	1 percent of sand
Core oil	1 percent of sand
Bentonite	1 percent of sand
Water	1·2 to 1·4 percent of sand

A-4 MIXING PROCEDURE

A-4.1 Take weighed quantity (5 kg) of sand in a clean laboratory mixer. Add white dextrin or white dextrin and bentonite powders and dry mix for two minutes. Add required quantity of water in a thin stream while the mixer is running. Mix for another 3 minutes. Add the core oil in a stream while the mixer is on. Mix for another 5 minutes. Discharge the sand into a polythene bag in as short a time as possible and close the bag immediately.

A-5 TESTING PROCEDURE

A-5.1 The testing of physical properties of the sand mixes that is, moisture content, green permeability, green compression strength, baked tensile strength, scratch hardness number and baked gas content shall be carried out in accordance with the procedure specified in IS 1918 : 1966.

A-6 BAKING TIME AND TEMPERATURE AND REPORTING OF RESULTS

A-6.1 For each sand mix, baking shall be carried out at 220 ± 5°C for 1, 1½, 2, 2½ and 3 hours. Average results of baked tensile strength for 3 specimens for each time shall be compared and the maximum value shall be specified (*see* Table 1). The time required to reach this maximum strength shall be used to grade the oil as fast or slow baking (*see* **4.1**). Scratch hardness and gas content of the maximum tensile strength specimens shall be as specified in Table 1.

ANNEX B

(*Clause* 7.1)

SAMPLING AND CRITERIA FOR CONFORMITY

B-1 LOT

B-1.1 In any consignment, all the drums having oil of the same grade and quality, manufactured at the same place shall be grouped together to constitute a lot.

B-1.2 Sample shall be taken and tested from each lot for ascertaining the conformity of the lot.

B-2 SCALE OF SAMPLING

B-2.1 The number of drums to be selected shall be according to col 1 and 2 of Table 2. These drums shall be taken at random (*see* IS 4905 : 1968).

Table 2 Number of Drums to be Sampled in the First Column

Number of Drums in a Lot N (1)	Number of Drums to be Selected n (2)
Up to 25	2
26 to 100	5
101 to 300	8
301 and above	13

B-3 PREPARATION OF TEST SAMPLES

B-3.1 Each of the drums selected according to col 1 and 2 of Table 2 shall be thoroughly mixed first. The sampling instrument shall be inserted slowly through a convenient opening. If possible, sample shall be drawn from end to end.

B-3.1.1 The sample drawn from individual drums shall be put into a clean dry receptacle. The contents of this receptacle shall be thoroughly mixed and divided into three equal parts. Each test sample shall be kept in a separate container. One sample shall be for the purchaser and one for the supplier and the third for the referee. There shall be three set of samples. In each set, there shall be as many samples as the number of drums drawn from each lot.

B-4 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

B-4.1 The test samples as prepared in **B-3** shall be tested individually for the requirements given in Table 1.

B-4.2 The lot shall be considered to conform to the requirements, if the test samples satisfy all the requirements and pass all the tests.

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